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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,027	09/30/2003	Paul S. Diefenbaugh	42P17651	9936

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EXAMINER	
LESPERANCE, JEAN E	
ART UNIT	**PAPER NUMBER**
2629	

DATE MAILED: 06/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/678,027	DIEFENBAUGH ET AL.	
	Examiner	Art Unit	
	Jean E. Lesperance	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *20-22* is/are allowed.

6)☐ Claim(s) *1-11 and 13-17* is/are rejected.

7)☒ Claim(s) *12,18 and 19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. The application filed September 30, 2003 is presented for examination and claims 1-22 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1-5, 7-11, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent # 6,831,621 ("Nakano").

Regarding claim 1, Nakano teaches a timing generator to control a refresh rate of a display (control signal generating circuit, Fig.29 (304)); a modulator to control a backlight frequency of a backlight (backlight control circuit and drive power supply, Fig.29 (308)); and a display driver connected to the timing generator and the modulator to adjust the backlight frequency of the backlight based on the refresh rate of the display (gate driver (306) connected to the control signal generating circuit (304) and the backlight control circuit and drive power supply (308)). The prior art does not explicitly teach to adjust the backlight frequency of the backlight based on the refresh rate of the display. However, the prior art teaches the backlight controller 7 receives the display order switching signal S1 at the L level from the main controller 5 to control the drive power supply 8 to change the order in which the backlight 12 turns on the light of the three colors according to the display order of subframes on a frame-by-frame basis (column 15, lines 35-40) and (shortening the display periods T.sub.R and T.sub.G of the subframes of the same color for successive display increases the frame frequency to ameliorate the deterrent to the image quality such as the above-mentioned color breakup (column 16, lines 15-18)).

Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the backlight controller 7 receives the display order switching signal S1 at the L level from the main controller 5 to control the drive power supply 8 to change the order in which the backlight 12 turns on the light of the three colors according to the display order of subframes on a frame-by-frame basis (column 15, lines 35-40) and (shortening the display periods T.sub.R and T.sub.G of the subframes of the same color for successive display increases the frame frequency to ameliorate the deterrent to the image quality such as the above-mentioned color breakup (column 16, lines 15-18)) to achieve "to adjust the backlight frequency of the backlight based on the refresh rate of the display" because this would provide a liquid crystal display device capable of controlling the writing timing of image data into the liquid crystal panel and the lighting timing of a backlight to improve the quality of a display image and display brightness.

Regarding claim 2, Nakano teaches the timing generator (control signal generating circuit, Fig.29 (304)) is arranged to produce at least one refresh rate of the display (the LEDs for the three colors of the backlight 12 are driven by PWM (pulse width modulated) pulses supplied from the drive power supply 8. The PWM pulses are generated at a frequency which is 20 to 100 times the frame frequency (column 17, lines 5-9) where the control signal generating circuit communicates with the drive power supply 8 to assign different tasks.

Regarding claim 3, Nakano teaches a buffer (image memory (303) is interpreted as being a buffer) connected to the timing generator (control signal generating circuit (304)) to output display data at the refresh rate of the display (liquid crystal panel display (301)).

Regarding claim 4, Nakano teaches an encoder (pixel data (PD) is interpreted as being an encoder) connected to the buffer (image memory (303) to encode the output the display data from the buffer for presentation on the display (liquid crystal panel display (301)).

Regarding claim 5, Nakano teaches the modulator (backlight control circuit and drive power supply (308) includes a pulse width modulator (the LEDs for the three colors of the backlight 12 are driven by PWM (pulse width modulated) pulses supplied from the drive power supply 8. The PWM pulses are generated at a frequency which is 20 to 100 times the frame frequency (column 17, lines 5-9) to operate at a modulation frequency that is controlled by the display driver.

Regarding claim 7, Nakano teaches the display driver (source driver (305)) is arranged to adjust the backlight frequency of the backlight to be an integer multiple the refresh rate of the display (the LEDs for the three colors of the backlight 12 are driven by PWM (pulse width modulated) pulses supplied from the drive power supply 8. The

PWM pulses are generated at a frequency which is 20 to 100 times the frame frequency (column 17, lines 5-9) and (a video signal supplied from a video signal source such as a personal computer has a tendency to show a small change but a strong correlation between a plurality of image data of the same color to be displayed in succession within a short time (column 15, lines 35-40)).

Regarding claim 8, Nakano teaches the display driver (source driver (305)) is arranged to adjust the backlight frequency of the backlight so that a beat frequency between the backlight frequency and the refresh rate of the display is greater than about 100 Hz (the LEDs for the three colors of the backlight 12 are driven by PWM (pulse width modulated) pulses supplied from the drive power supply 8. The PWM pulses are generated at a frequency which is 20 to 100 times the frame frequency (column 17, lines 5-9) and (a video signal supplied from a video signal source such as a personal computer has a tendency to show a small change but a strong correlation between a plurality of image data of the same color to be displayed in succession within a short time (column 15, lines 35-40)) and it is desirable to control the frame frequency at 60 Hz or higher to ameliorate the above-mentioned color mixing and flicker (column 19, lines 50-52).

Regarding claim 9, Nakano teaches a display (301) that includes a backlight (302), comprising: changing an original refresh rate of the display to a new refresh rate (shortening the display periods T.sub.R and T.sub.G of the subframes of the same color for successive display increases the frame frequency to ameliorate the deterrent to the image quality such as the above-mentioned color breakup (column 16, lines 15-18));

determining a desired modulation frequency for the backlight based on the new refresh rate of the display (the driver circuit reduces a pulse width of an address signal to be applied to a scanning line of the liquid crystal display panel in accordance with the write cycle duration (column 4, lines 5-8)); and adjusting a frequency of the backlight to the desired modulation frequency (the backlight controller 7 receives the display order switching signal S1 at the L level from the main controller 5 to control the drive power supply 8 to change the order in which the backlight 12 turns on the light of the three colors according to the display order of subframes on a frame-by-frame basis (column 15, lines 35-40) and (shortening the display periods T.sub.R and T.sub.G of the subframes of the same color for successive display increases the frame frequency to ameliorate the deterrent to the image quality such as the above-mentioned color breakup (column 16, lines 15-18)). The motivation in claim 1 is also applied to claim 9.

Regarding claim 10, Nakano teaches lowering the refresh rate of the display to the new refresh rate that is different than the original refresh rate (control is exercised so that the duty ratio of the PWM pulses to be applied to the red LEDs gradually increases whereas the duty ratio of the PWM pulses to be applied to the green LEDs gradually decreases. In the early stage of a B subframe display period, control is exercised so that the duty ratio of the PWM pulses to be applied to the red LEDs gradually decreases whereas the duty ratio of the PWM pulses to be applied to the blue LEDs gradually increases (column 17, lines 10-18)).

Regarding claim 11, Nakano teaches obtaining the desired backlight frequency that is a multiple of the new refresh rate (the LEDs for the three colors of the backlight

12 are driven by PWM (pulse width modulated) pulses supplied from the drive power supply 8. The PWM pulses are generated at a frequency which is 20 to 100 times the frame frequency (column 17, lines 5-9)).

Regarding claim 13, Nakano teaches ascertaining a desired modulation frequency for a modulator connected to the backlight that will produce the desired backlight frequency for the backlight (the backlight controller 7 receives the display order switching signal S1 at the L level from the main controller 5 to control the drive power supply 8 to change the order in which the backlight 12 turns on the light of the three colors according to the display order of subframes on a frame-by-frame basis (column 15, lines 35-40) and (shortening the display periods T.sub.R and T.sub.G of the subframes of the same color for successive display increases the frame frequency to ameliorate the deterrent to the image quality such as the above-mentioned color breakup (column 16, lines 15-18)).

Regarding claim 14, Nakano teaches controlling the modulator to produce the desired modulation frequency (control is exercised so that the duty ratio of the PWM pulses to be applied to the red LEDs gradually increases whereas the duty ratio of the PWM pulses to be applied to the green LEDs gradually decreases. In the early stage of a B subframe display period, control is exercised so that the duty ratio of the PWM pulses to be applied to the red LEDs gradually decreases whereas the duty ratio of the PWM pulses to be applied to the blue LEDs gradually increases (column 17, lines 10-18)).

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent # 6,831,621 ("Nakano") in view of US Patent # 6,980,225 ("Funamoto et al.").

Regarding claim 6, Nakano fails to teach an inverter connected between the modulator and the backlight to operate the backlight at the backlight frequency based on the modulation frequency of the modulator.

However, Funamoto et al. teach an inverter Fig.1 (103) connected to the PWM MODULATION PULSE GENERATING CIRCUIT Fig.1 (4) and the backlight Fig.1 (104).

Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize the inverter as taught by Funamoto in the liquid crystal display device disclosed by Nakano because this would enable reduction of the image contour blurring in a moving image, as well as attainment of higher-quality image display (column 4, lines 40-42).

4. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent # 6,831,621 ("Nakano") in view of Us Patent # 6,426,736 ("Ishihara").

Regarding claim 15, Nakano teaches a panel to display image data thereon (liquid crystal panel, Fig.29 (301)); a backlight to illuminate a rear of the panel (RGB backlight Fig.29 (302)); a timing generator to control a refresh rate of the panel (control signal generating circuit Fig.29, (304)); a modulator to control the backlight based on an associated modulation frequency (backlight control circuit and drive power supply, Fig.29 (308)); a coordinator to coordinate between the refresh rate and the modulation frequency when the refresh rate or the modulation frequency is changed (control is exercised so that the duty ratio of the PWM pulses to be applied to the red LEDs gradually increases whereas the duty ratio of the PWM pulses to be applied to the green LEDs gradually decreases. In the early stage of a B subframe display period, control is exercised so that the duty ratio of the PWM pulses to be applied to the red LEDs gradually decreases whereas the duty ratio of the PWM pulses to be applied to the blue LEDs gradually increases (column 17, lines 10-18)). Accordingly, the prior art teaches all the claimed limitations with the exception of providing an antenna proximate the panel.

However, Ishihara teaches an antenna 11 which receives a reception wave from the base station (column 3, lines 53and 54).

Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize the antenna as taught by Ishihara in the liquid crystal display device disclosed by Nakano because this would provide portable telephone which can be immediately operated even in a dark place to improve operability and can reduce power consumption of a battery to allow longer time use (column 1, lines 61-64).

Regarding claim 16, Ishihara teaches an audio device proximate the panel (radio unit Fig.1 (12)).

Regarding claim 17, Ishihara teaches a communication interface proximate the panel (the user inputs speech in speech communication or the like with the microphone 16. The receiver 17 outputs partner speech in speech communication. The sensor signal detector 18 detects a sensor signal from the touch sensor 19. The backlight 20 is controlled by the controller 15 (column 3, lines 32-36)).

Allowable Subject Matter

5. Claims 12, 18, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. Claims 20-22 are allowed.

The following is an examiner's statement of reasons for allowance: the claimed invention is directed to a system.

Dependent claim 12 identifies a uniquely distinct feature "obtaining the desired backlight frequency so that a beat frequency between the desired backlight frequency and the new refresh rate is too high to be visually perceived by a user of the display".

Dependent claim 18 identifies a uniquely distinct feature "wherein the coordinator is arranged to control the timing generator and the modulator to result in one of the refresh rate and the modulation frequency being a multiple of another of the refresh rate and the modulation frequency".

Dependent claim 19 identifies a uniquely distinct feature "wherein the coordinator is arranged to control the timing generator and the modulator to result in a beat frequency between the refresh rate and the modulation frequency being too high to be visually detected by a user of the system".

Independent claim 20 identifies a uniquely distinct feature "means for coordinating between the means for controlling and the means for adjusting to substantially avoid a beat frequency between the refresh rate and the operational frequency that is visually perceptible by a user of the system".

The closest art, Funamoto et al., Nakano, and Ishihara as discussed above, either singularly or in combination, fail to anticipate or render obvious the above limitations obvious.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean Lesperance whose telephone number is (571) 272-7692. The examiner can normally be reached on from Monday to Friday between 10:OOAM and 6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe, can be reached on (571) 272-7691.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(571) 273-8300 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Jean Lesperance
Jean
Technology Division 2629

Date 6/6/2006

RICHARD HJERPE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600